In hôc Caſu, iſta Tria ſunt conſideranda, viz. Vitæ genus, Ætas, Ætatiſque Periodus.

Primò enim à tam diuturna exercendi deſuetudine, vix potuit non evenire inæqualis Alimenti diſtributio. Quemadmodum itaque Oſſa, & ſæpe Viſcera, ex inepta Nutritione, ſupra modum augentur in Rhachitide: pariter & hîc Lien, ex eodem Nutritionis vitio, videtur ampliorem molem accepiſſe.

Præcipuè, cùm ſecundò, hâc vitæ conſuetudine uſa eſt illa Virgo, non in provectiori ætate, ſed florente adhuc adoleſcentiâ. Exercitia enim neceſſaria ſunt, etiam ad debitam nutritionem: multò magis ad Partium æquale Incrementum.

Tertiò, & in illa ipſa ætatis periodo, quâ Menſes primo effluere ſolent. Quibus inde ſuppreſſis, vel multùm imminutis, iſte ſanguis, quem deſidioſa Natura omiſit eliminare per conſuetas vias, ex parte in Lienem, quaſi quoddam diverticulum, rejiciebatur.

Corollarium. *Virginibus, nimia Exercitiorum intermiſſio, inprimis circa finem ſecundi, aut principium tertii ætatis Septenarii, peſſima.*

An Account of a Book. Oſteologia Nova, *or ſome Obſervations of the* Bones, *&c. Communicated to the Royal Society, in ſeveral Diſcourſes, Read at their Meetings, by the Learned and Accurate Author,* Clopton Havers, M. D. *and* R. S. Soc. Lond. 1691, Octavo, *for* Sam. Smith.

THE Author offering to give ſome Account of the manner, in which the Bones are firſt formed, ſuppoſes, that they, as all the other parts of the Body, are formed in the Egg before the Female is impregnated, and that the Seed of the Male does only put thoſe Particles,

which are the firſt Principles of the Spirits, and Humors, into motion, by which motion they begin a Circulation, and being expanded they dilate the containing parts, whoſe Dilatation both cauſes an Encreaſe in the Dimenſions of the Animal, and makes them more capable of the Acceſſion of new Particles to nouriſh and augment them.

Coming to deſcribe the Nature and Structure of the Parts, which are the Subject of the Diſcourſe, he begins with the *Perioſtium*, or Membrane which inveſts the Bones, which conſiſts of two ſorts of Fibres, one of which lying next to the Bone it ſelf, is derived from the *Dura Mater*, the other from the Tendons of the Muſcles. The uſe of this Membrane is to cover the Bones; To convey Spirits into them for their Senſe, and to aſſiſt in their Nutrition, to which end it has Fibres inſerted into them; To limit their Growth; To keep ſome of them conjoyn'd; To joyn the Bones and their Cartilages together; to faſten the Heads and Tendons of the Muſcles to the Bones; and laſtly, for the ſafety and ſecurity of the Bones againſt Injuries, as it ſerves to make them ſenſible, and ſo gives the Animal a quick apprehenſion of any Miſchief that threatens thoſe parts, and directs us in our application of Remedies when they are injured.

The Bones, tho they are at firſt Gelatinous, and afterwards Cartilaginous, are when they come to their true and proper nature, ſolid and hard, conſiſting of terreſtrial and ſaline Particles. Theſe Particles, being in their ſeveral Series united at their Extremities, form Strings, and theſe Strings being united make diſtinct Plates, which lying one over another make the whole Thickneſs of the Bone. In and between theſe Plates he obſerves two ſorts of Pores, ſome which run through every Plate, others which are formed between them for the Diſpenſation of the Medullary Oil to the Subſtance of the Bone. The Superficies of the Bones is unequal being rendered ſo by ſome ſuperficial Cavities, and by paſſages which penetrate into them, the firſt of which are for enlarging their Surface, and ſtrengthening the Adheſion of their Membrane to them; the other for the ingreſs of Blood Veſſels into their Subſtance or Cavities. The Cavities of the Bones are in ſome large, in others ſmall and numerous, whoſe Partitions are formed of Plates propagated wholly from thoſe Plates which make the ſides of the Bones in ſuch as have long Cavities; and in them which are ſpongious, from Plates which run up the whole length of the Bone in that manner. And in ſome Bones there are *Faſciculi* of Strings which run off from the Plates in the Sides, and made a ſort of *Cancelli*, or Net-work in the Cavity.

In the Bones there are Blood-Veſſels, which ſerve for their Nouriſhment, which are many; the Arteries entering at one end, and the Veins coming out in vaſt numbers, either at the contrary extremity, or in ſome intermediate parts: And there are both Veins and Arteries belonging to the Marrow.

In the Teeth he obſerves a twofold Subſtance, one of a ſtony Nature, which is the Cortical or exterior part of ſo much of the Teeth as ſtands out of the Gums; the other truly Bone, conſiſting of *Laminæ* or Plates, as the other Bones do.

In the ſecond Diſcourſe he gives an Account of the manner of Accretion, and Nutrition in general, and then particularly in the Bones. The Matter, which gives an encreaſe to the Animal, is originally from the Chyle, the Particles of which deſigned for Nouriſhment being elaborated in the Maſs of Blood, and ſo reduced nearer to the nature of a *Succus nutritius*, and diſpoſed for a Separation, are ſecerned from the ſanguineous Maſs, by Glands ſeated on the Sides of the Arteries all over the Body. And here the Author takes occaſion to ſpeak of Glandular Secretion; to explain which he obſerves, firſt that all motion in its proper tendency is direct, and that the Glandules are ſo ſeated, as to favour the motion of any Particles that ſtrike againſt them in a right Line, more than the Veins; and having Pores adapted to the Figure of the Particles which they ſeparate, the Particles do endeavour in their motion to proceed into thoſe Glandules, and being entertained by them, are ſeparated, and diſtinguiſht from the reſt of the Maſs of Blood, and ſo aſſume the form of that Liquor we find ſeparated by every Gland: And to prevent the Regurgitation of the ſeparated Matter out of the Glandules into the Maſs of Blood again, (becauſe the Ducts, which convey it to the Receptacles, do not run ſo as to favour the direct motion of the Particles,) he ſuppoſes ſome contrivance like Valves in the Pores by which the Particles enter into the Glandules.

How the Situation of the nutritious Glandules agrees with his Aſſertion, that the Glandules are ſo ſeated as to favour the motion of a Particle in a right Line, more than the Veins, is ſhown by obſerving the gradual contraction of the arterial Channel.

He then goes on with the affair of Accretion, and the account is in ſhort this, that the Nutritious Particles, being ſeparated by the Glandules plac'd in the ſides of the Arteries, are carried into thoſe ſmall nervoſe Pipes, or Interſtices of the Fibres where the Spirits move, ſo that they fall in the way of the Spirits motion. The Spirits he ſuppoſes to have a twofold motion, one direct, the other rotatory turning upon their Axis. Whilſt the Animal is capable of Accretion, and the Particles of which the ſolid parts conſiſt are not entirely united at their extremities, but are capable of receding one from another, both laterally and at their extremities; the Spirits act upon the nutritious Particles, which are of a viſcous nature, by their rotatory motion, by which they carry them to the ſides of the Fibres and bony Strings, driving ſome againſt the ſides of their parts and forcing them out laterally; others into the Interſtices between their extremities, (thereby elongating every Series of them;) where they are apponed, and fixed, and thus the parts increaſe both in their thickneſs, and longitude. But after the Particles are united at their extremities, and no longer capable of making room to lodge the nutritious parts out of the way of the Spirits direct motion; then the Spirits come to act upon the nutritious Matter by that motion, and to drive it ſo thorough the nervous Channels that it has not the liberty of ſtopping, and adhering, and ſo the Accretion of the Animal Ceaſes.

Nutrition he makes to be no reparation of the loſs of the ſubſtance of the Solid parts ordinarily, but only a continual ſucceſſion and ſupply of Spirits, and of all thoſe fluid parts, which fill the containing parts and preſerve them diſtended.

The Rickets being a Diſtemper in which the Accretion of the Bones is concerned, he does ſuppoſe that the incurvation of the Bones is neither from a preternatural ſhortneſs of the Muſcles, nor an unequal ſupply of Spirits and nouriſhment of the ſeveral parts of the Bones; but from a different temper in the ſeveral parts of them: that on one ſide they continue in their Affinity to the Nature of the Cartilage, whilſt on the other they approach nearer to the temper of a perfect Bone; ſo that the Particles are in one place more apt to recede and to give way for the acceſſion of new Nouriſhment: and conſequently there is a greater increaſe than in the other. From which unequal Accretion the Bone will be incurvated, and the Concave of their Arch will be on that ſide which is leaſt augmented, and the Convex on the other.

For Venereal Nodes in the Bones; he ſuppoſes that the venenoſe Matter does eat ſome little holes in the *Laminæ*, and ſo makes room for the reception of ſome of the nutritious Matter, on one ſide of the Spirits motion: and then the Spirits by their rotatory motion will determine ſome of it to thoſe little holes; ſo that if any of thoſe preternatural *Foramina* reach to the Superficies of the Bone, ſome part of the nutritious Juice will be thrown out upon the ſurface of the Bone, where indurating into a bony ſubſtance it produces gummatous inequalities.

The third Diſcourſe concerns the Marrow, which has blood Veſſels, both Veins and Arteries. The Organs by which the Medullary Oil is ſeparated, are ſmall Veſicles of Glandules, which are conglomerated into diſtinct Lobules contained in ſeveral Membranes or Baggs, which lie contained in one common Membrane inveſting the whole Marrow: all which both Veſicles, Baggs and Membrane are propagated from the exteriour Coat of the Arteries. The paſſage of the Medullary Oil from all parts of the Marrow to the Bone is not by Ducts, but by Pores formed in the Veſicle, by which it paſſes from one to another, till it arrives at the ſides or extreme parts of the Bone.

The Medullary Oil, which is ſupplyed to the Interſtices of the Joynts, paſſes into them by paſſages penetrating through the Bone into theſe Cavities, and formed for this end.

The uſe of the Medullary Oil is either common to all the Bones, or more proper to the Joynts. To all the Bones it is ſerviceable, and neceſſary to preſerve their temper, and keep them from being brittle. In the Articulations, Firſt, It lubricates the extremities of the Bones, and ſo makes them more apt to be moved. Secondly, It preſerves the ends of the articulated Bones from an inordinate incaleſcence. Thirdly, It prevents the Attrition of thoſe parts of the Bones, which are rubbed one againſt another. It is likewiſe beneficial to the Ligaments of the Joynts in preſerving them from dryneſs and rigidity, and lubricating thoſe parts of them, which ſlide upon the Bone. Thoſe Cartilages alſo which are joyn'd to any of the Bones it preſerves flexible.

In the fourth Diſcourſe we have an account of a particular ſort of Glands, which he calls the mucilaginous Glands ſeated in the Joynts. Theſe are of two ſorts; ſome are ſmall, and in a manner miliary Glands, being Glandules placed all upon the ſame Surface of the Membrane, which lies over the Articulations. The other ſort are conglomerate, or many Glandules collected and planted one upon another, ſo as to make a bulk, and conſiderable Glands. In ſome of the Joynts there are ſeveral of them, in ſome there is a ſingle Gland. For the Structure of theſe large Glands, they conſiſt of ſmall Veſicles, which are not gathered into ſeveral Lobules or Bags of Glandules, but are diſpoſed upon ſeveral Membranes lying one over another, of which Membranes there are ſeveral in every one of theſe Glands, which appear evidently in ſome that are Hydropical.

They have their Blood Veſſels, as other Glands, but their Veins have a particular flexure in their courſe for retarding the return of the Blood from the Glands, that the mucilaginous Liquor, which is not ſeparated with the greateſt expedition, may have time to penetrate the ſecretory Pores of the Glandules.

The large mucilaginous Glands are variouſly ſeated, ſome in a *Sinus* formed in the Joynt, others ſtand near or over againſt the Interſtice between the articulated Bones, but in general they are ſo placed as to be ſqueezed gently, and lightly preſt in the inflexion or extenſion of the Joynt, ſo as to ſeparate a quantity of Macilage proportionate to the motion of the part, and the preſent occaſion, and yet without any injury.

We have alſo ſome deſcription of the common Membrane of the Muſcles, how it is every where ſet thick with the ſmall mucilaginous Glands; and about ſome Joynts which are often moved, and where the Tendons run backward and forward more conſiderably, it has ſome larger or conglomerate Glands.

The deſign of all theſe Glands is to ſeparate a mucilaginous kind of Liquor, that ſerves principally to lubricate the Joynts, to make them ſo ſlippery as to be moved with the greateſt facility imaginable. It ſerves likewiſe to preſerve the ends of the articulating Bones from Attrition, and an immoderate incaleſcence. But all theſe things it performs in Conjunction with the Medullary Oil. Of which two Ingredients is made a Compoſition admirably fitted for thoſe ends: For the Mucilage adds to the lubricity of the Oil, and the Oil preſerves the Mucilage from growing too thick and viſcous.

The Author obſerving the ſame ſort of Glands to lie between the Muſcles and Tendons, ſuppoſes that there is the ſame mixture of an oily and mucilaginous Subſtance, the one being that Fat which is found between the Muſcles, and is ſupplyed by the adipoſe Glands; the other being ſeparated by the mucilaginous Glandules, of which the common Membrane of the Muſcles is every where full. This mixture in the interſtices of the Muſcles lubricates them and their Tendons, and preſerves them from ſhrinking, and from growing dry and rigid.

For the Generation of this Mucilage he ſuppoſes that Nature has deſigned one large *Viſcus*, and that this is the Office of the Spleen; the Glandules of which he makes to have two ſecretory Pores, by one of which ſome Acid, and by the other ſome Auſtere Particles are ſeparated; which meeting in the ſmall Cavities of the Glandules, they are converted into a mucilaginous and gummous Subſtance, having obſerved that the Spirit of Vitriol mixt with a Decoction of Galls, will produce a Gum.

In the next place follows an account of ſome Experiments made with the Mucilage, the moſt of which come to this, that all Acids do coagulate it, as all Auſteres, and Auſtere Acids: but with this difference that the *Coagulum* or Curd made with Acids only is tenderer than that which is produced by an Auſtere only, or an Auſtere Acid.

Theſe Experiments being made and deſcribed in order to explain the Nature and Cauſes of a Rheumatiſm, and the Gout, theſe Diſtempers are next treated of.

The Matter or Humour producing a Rheumatiſm is made to have a different Nature in ſeveral Patients; in ſome it is Acid, in ſome Saline, and in others Acrious. This Matter whilſt it lies in the Maſs of Blood, temper'd with the other parts, ſcarce gives any ſenſible effect: but the mucilaginous Glands between the Muſcles, (as we ſee other Glands of the Body often do.) ſerving ſometimes for the Depuration of the Sanguineous Maſs, by ſeparating from it incongruous and morbifick Particles, this Matter ſo ſeparated comes to be more ſtrong and ſincere, ſo as to have a ſenſible effect upon the Fibres, pricking and irritating of them, and if the Matter be an Acid or Auſtere, it affects the Mucilage it ſelf, ſo as to coagulate it in the Interſtices of the Muſcles, which produces that Rheumatiſm, which is fixt, and where the Blood is very ſizy.

As there is a difference in the Matter, which produces the Diſtemper, ſo it is to be treated with different means. Where the Matter is thin and acrious; with temperate and cooling Medicines, together with ſuch gentle Diaphoreticks, as have themſelves no Acrimony. Where the Humour is ſalt; with diluting and aqueous things together with ſome Diureticks. And when the Mucilage is coagulated with an Acid above other things, the moſt proper Medicines ſeem to be ſuch as diſſolve a *Coagulum*, ſuch are *Oleum Tartari per deliquium*, Spirit of Salt Armoniack, and Spirit of Harts-Horn.

In the Gout the humour likewiſe is of a different Nature; ſometimes Acid, or Saline, and ſometimes Acrious. This Matter is ſeparated in the manner of a *Criſis* by the mucilaginous Glands of the Joynts, where it always affects the ſenſible parts about them; and if it be Acid makes a Coagulation, or inſpiſſates the Mucilage, and then the Gout ſticks ſome conſiderable time. The generation of the *Tophaceous* Matter in the nodoſe Gout is accounted for, from the Experiments made with Acid-Auſtere Liquors mixed with the Mucilage; ſo that where the Gout is nodoſe, the Mucilage is firſt coagulated by ſome Acid-Auſtere Matter, and the *Coagulum* made by ſuch a Matter is not ſo eaſily diſſolved, as when it is made by an Acid only. This *Coagulum* therefore being impriſoned, and the more groſs and earthly parts being uncapable of an evaporation or being otherwiſe ſpent, are concentrated and indurated by the evaporation or flowing off of the moiſt Particles, and ſo produce a hard, and chalkey Subſtance.

The laſt Diſcourſe is of the Cartilages, which approach near to the Nature of the Bones, but differ from them in their Formation, and in their flexibility: This flexibility is from the Figure and order of their parts, which are ſuch that the Particles (as they muſt ſlide one way or other in the inflexion of a Body) may move without interrupting the continuity of the whole, even when they recede from one another, unleſs they are forced too far. That recoyling, which is found in theſe and other flexible Bodies that have a rigidity, ariſes from a preſſure made by the ſpring of the Air, either implanted and ſhut up in the interſtices of the Particles, as when the Particles are driven nearer to one another, and thoſe Interſtices are contracted: or by the Elaſtick power of the external Air, when the Particles of the Body recede from one another, and drive up the ſpring of that Air.

The Cartilages have a Membrane every way like to the *Perioſtium*, and is a continuation of it, where they are joyned to any Bones. Blood Veſſels they likewiſe have in great numbers.

The uſe of the Cartilages in general is to give a ſtrength to ſome parts, which did ſtand in need of ſuch Bodies as both were flexible and had a rigidity. Thoſe of the Ribs are deſigned to made them capable of an Elongation, that ſo they may protrude the *Sternum* one way, and drive back the *Vertebres* of the Breaſt the other, whereby there is an addition made to the capacity of the Breaſt. Theſe Griſtles ſerve likewiſe in the contraction of the Breaſt. For having their natural Figure altered in the elevation of the Ribs, and the ampliation of the Cavity of the *Thorax*, they do naturally endeavour to regain their firſt Figure, and to return into their proper poſture, by which endeavour they help ſomething towards the depreſſion of the Ribs, and the contracting the Cavity of the Breaſt.

FINIS.

LONDON.

Printed and are to be ſold by *Samuel Smith*, at the Princes
Arms in S. *Paul's* Church-Yard. 1691.